

## Portable Energy Audit Tool (PEAT)

Central Scientific Instruments Organisation (CSIO), with the head quarters at Chandigarh is a premier national laboratory dedicated to research, design and development of scientific and industrial instruments. During 1990s, CSIO Chennai Centre is identified for working in the area of Energy Management Instrumentation. CSIO Chennai Centre successfully completed projects funded by Ministry of Power, DST and international funding agency IGEEP-GTZ, Germany. CSIO Chennai Centre also provides Energy Audits, calibration services etc to the regional industries. CSIO Chennai centre developed a Low Cost Portable Energy Audit Tool as an in house project keeping in view the requirements of Energy Auditors/ Energy Managers etc.

For establishing baseline data associated with energy saving proposals, real time measurement of electrical energy and other physical parameters over a period of 24 hrs to few days is necessary. Energy auditors are giving energy saving proposals based on the data provided without real-time measurement as affordable and logging equipment as a single unit is not available. The Portable energy audit tool is developed keeping in view the requirements of energy auditors to log different parameters (electrical energy, temp, pressure, flow etc.) i.e. taking signals from the existing transmitters.

The system developed by CSIO is shown in fig. 1 will enable them to show the real time data and demonstrate the concepts of energy savings proposal. The developments in micro controllers incorporating multitasking features, built-in RTC, ADC, Flash & RAM memory, SPI bus and single chip IC's for comprehensive measurement of electrical parameters make it possible to reduce the cost of the equipment. The data logged in the system can be downloaded into a PC through a serial port. The system supports standard MODBUS protocol. The application software developed on the PC side for establishing the communication with the data logger and generating the graphs, reports etc.,



FIG. 1. PORTABLE ENERGY AUDIT TOOL

The Portable Energy Audit Tool designed & developed by CSIO block diagram is shown in fig.2.. The system has the following main features:

- 1-channel of 3 $\phi$  Energy Measurement
- 4-channels of Analog Inputs,
- 8-channels of Digital Inputs and
- Built-in Flash memory (512kB) & RAM of 1 MB
- RTC with battery backup
- LCD Display with 4 line & 20 characters with Backlight.
- 4 – Keys Membrane Keypad.
- Battery operation for the entire unit to make it portable.

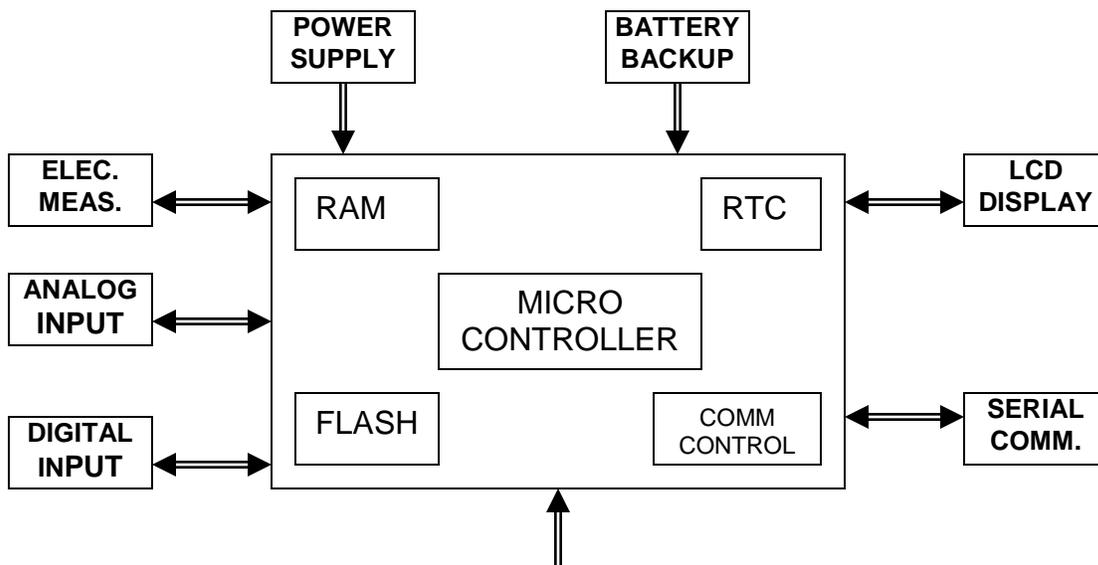


FIG.2. BLOCK SCHEMATIC OF THE PEAT

The software incorporated in the PEAT has the following Features:

- ✓ Data collection and logging with flexible Data logging interval (1min for 200 hours)
- ✓ Configuration of PEAT
- ✓ Storing of all or only selected parameter information
- ✓ Serial interfacing for Downloading to PC via RS232
- ✓ Supports MODBUS protocol

The application software developed for PC has the following features.

- ✓ Downloading algorithm using MODBUS communication protocol.
- ✓ Storing of information into the MS-ACCESS database.
- ✓ Export data to MS-EXCEL or CSV or TEXT format for data exchange.
- ✓ Off-line trend graph, bar & Pie chart using the downloaded data.
- ✓ On-line accessing of the data from the PEAT for display and graph.
- ✓ Printing the data table and graph.
- ✓ Recording threshold, raising alarm and annunciation.
- ✓ Remote Configuration of the PEAT from the PC.
- ✓ Statistical analysis of the data (min, max, Std, mean etc.,)

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